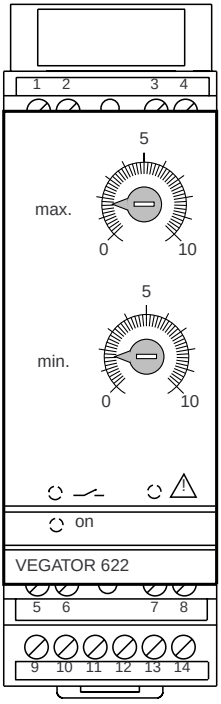
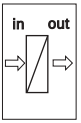
Operating Instructions

VEGATOR 620, 621, 622





Contents

Safety information 2
Note Ex area 2

1 Product description

1.1 Function and configuration 3
1.2 Approvals 3
1.3 Types and versions 4
1.4 Technical data and dimensions 5

2 Mounting and installation instructions 9

3 Electrical connection

3.1 Connection instructions 10
3.2 Connection instructions for Ex approved applications 10
3.3 Connection diagrams 11

4 Setup

4.1 Indicating and adjustment elements 13
4.2 Setup sequence 14
4.3 Switching point adjustment 15

5 Diagnostics

5.1 Maintenance 17
5.2 Repair 17
5.3 Failure rectification 18

Safety information

Please read this manual carefully, and also take note of country-specific installation standards (e.g. the VDE regulations in Germany) as well as all prevailing safety regulations and accident prevention rules.
For safety and warranty reasons, any internal work on the instruments, apart from that involved in normal installation and electrical connection, must be carried out only by qualified VEGA personnel.

Note Ex area

Please note the attached safety instructions containing important information on installation and operation in Ex areas.
These safety instructions are part of the operating instructions and come with the Ex approved instruments.

1 Product description

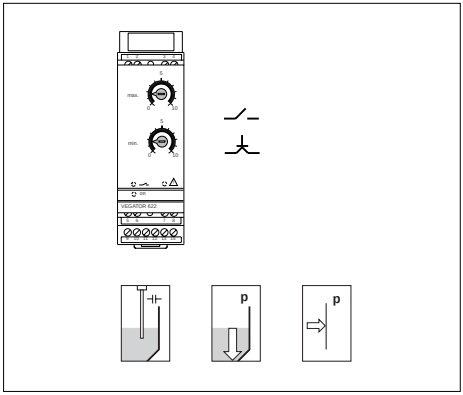
1.1 Function and configuration

VEGATOR 620 ... 622 signal conditioning instruments are module units with plug-in socket, suitable for carrier rail mounting (DIN 46 277). In conjunction with sensors they are used for level detection and switching command output, which is triggered by relay and transistor switches.

Typical applications are double point controls, e.g. pump controls (on/off) and monitoring functions such as overfill or dry run protection.

The instruments are equipped with adjustable integration time. The integrated fault monitoring (not with VEGATOR 620) detects short circuit or interruption of the measuring circuit. In case of failure, a failure LED lights up. The level relay and the transistor output deenergise.

To construct a measuring system you need a VEGATOR ... level switch and a sensor with analogue measured data transmission, i.e.
- capacitive meas. probes,
- hydrostatic pressure transmitters or
- process pressure transmitters.



VEGATOR...

1.2 Approvals

If measuring systems are installed according to the following approvals, the appropriate official documents have to be noted and the regulations observed. The documents are supplied with the respective measuring system.

WHG approval
VEGATOR 621 and 622 signal conditioning instruments with capacitive meas. probes or pressure transmitters as part of an overfill protection according to WHG.

General type approval
no. Z.-65.13-105

Ex approval
When using measuring systems in Ex and StEx areas, the instruments must be suitable and approved for these applications and explosion zones. The suitability is checked by approval authorities and certified in approval documents. VEGATOR 621 Ex and 622 Ex are provided with Ex approval according to CENELEC (PTB no. Ex-96.D.2068).

CE conformity
VEGATOR 620, 621 and 622 signal conditioning instruments see „1.4 Technical data“.

1.3 Types and versions

VEGATOR 620

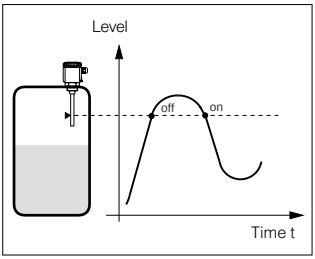
Single point level switch (fixed switching hysteresis) with selectable mode A/B (A = overfill protection, B = dry run protection) and adjustable integration time

Inputs:

- active: 1 capacitive probe,
  1 hydrostatic pressure transmitter or
  1 process pressure transmitter
- passive: for connection to an active circuit

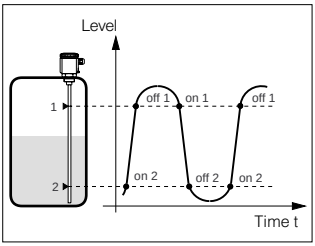
Output: 1 relay (spdt)

Application: level detection, overfill protection, dry run protection



VEGATOR 620 single point level switch

When using two VEGATOR 620 connected to one sensor, it is possible to provide a dual single point control.
It is possible to connect up to 10 VEGATOR 620 to one sensor, see „3.3 Connection diagrams“.



Double single point control with two VEGATOR 620

VEGATOR 621

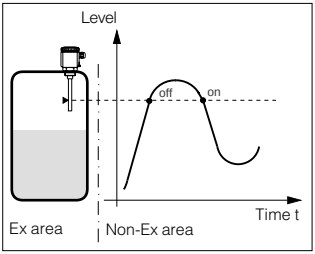
Single point level switch (fixed switching hysteresis) with fault monitoring, selectable mode A/B (A = overfill protection, B = dry run protection) and adjustable integration time

Input: 1 capacitive probe or
1 hydrostatic pressure transmitter or
1 process pressure transmitter

Outputs: 1 relay (spdt)
1 transistor

Approval: [EEx ia] IIC,
as part of an overfill protection acc. to WHG

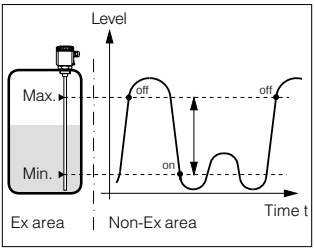
Application: level detection, overfill protection, dry run protection



VEGATOR 621 single point level switch

VEGATOR 622
Double point level switch
with fault monitoring, adjustable switching hysteresis, selectable mode A/B (A = overfill protection, B = dry run protection) and with adjustable integration time

Input:	1 capacitive electrode 1 hydrostatic pressure transmitter 1 process pressure transmitter
Outputs:	1 relay (spdt) 1 transistor
Approvals:	[EEx ia] IIC, as part of an overfill protection acc. to WHG
Application:	Min./max. control, overfill protection, dry run protection



VEGATOR 622 double point level switch

1.4 Technical data and dimensions

General data

Power supply

Operating voltage	20 … 72 V DC 20 … 250 V AC, 50/60 Hz (sine) in case of emergency power supply with curve form extremely deviating from sine: max. 125 V AC (rectangle)
Power consumption	max. 3 W (3 … 18 VA)
Fuse	
- supply range	T 1 A, 250 V

Measurement data input, general

Number	1 current input
Input type	active two-wire input analogue
Range	4 … 20 mA
Sensor	capacitive probes hydrostatic pressure transmitters process pressure transmitters
Sensor supply voltage	
- VEGATOR 620	24 V DC
- VEGATOR 621, 622	15 … 18 V DC
Switching threshold	4 … 20 mA adjustable
Min. hysteresis	
- VEGATOR 620, 621	80 µA
- VEGATOR 622	80 … 16000 µA
Current limitation	at 24 mA, permanently shortcircuit proof
Temperature error	0.05 %/10 K of range
Connection cable	2-wire (standard cable)
Resistance per wire	
- VEGATOR 620	max. 250 Ohm
- VEGATOR 621, 622	max. 35 Ohm

Additional measurement data input on VEGATOR 620

Number	1 additional current input
Input type	passive two-wire input analogue
Range	4 ... 20 mA
Inner resistance	22 Ohm
Application	switching in series with active inputs of e.g. VEGATOR 620, VEGAMET 601
Hysteresis	80 µA
Temperature error	0.05 %/10 K of range

Relay output

Number	1 output
Contact	1 spdt (12 - 13 open, 12 - 14 close)
Contact material	AgCdO and Au plated
Switching voltage	min. 10 mV DC max. 250 V AC, 250 V DC
Switching current	min. 10 µA DC max. 3 A AC, 1 A DC
Breaking capacity	max. 750 VA, 54 W

Transistor output (not on VEGATOR 620)

Number	1 output (synchronously switching with the relay outputs)
Switching voltage U_{CE}	max. 36 V DC
Switching current I_C	max. 60 mA DC (short circuit proof, transistor limits the current in case of short circuit to a stand-by current of approx. 5 mA)
Voltage loss U_{CE}	- 1.5 V at I_B = 60 mA
Blocking current I_O	< 10 µA

Electrical connection

Screw terminal	max. 1.5 mm²

Electrical protective measures

Protection	
- instrument	IP 30
- socket	IP 20
Protection class	II
Overvoltage category	II

Mechanical data

Mounting	carrier rail mounting acc. to DIN 46 277, p. 3
Dimensions	W = 36 mm, H = 118.5 mm, D = 134 mm
Weight	approx. 170 g

Ambient conditions

Permissible ambient temperature	-20°C ... +60°C VEGATOR 620: With an operating voltage of 60 V DC ... 72 V DC the permissible ambient temperature declines linearly from 60°C to 40°C.
Storage and transport temperature	-40°C ... +70°C
Option	specially protected (tropicalised) electronics

Indicating elements

LED in front plate	green on: operating voltage on yellow: switching point control red: fault signal

Functions

Mode (selectable)	overfill protection (A) dry run protection (B)
Integration time (adjustable)	0.2 ... 20 sec.

Adjustment elements

Front plate	one or two potentiometers with scale 0 ... 10 for switching point adjustment
On top cover, to the side	DIL for adjustment of: - mode A/B (A = overfill protection, B = dry run protection) - integration time - switch on/off delay

Electrical separation measures

Reliable separation acc. to VDE 0106, part 1; between	power supply, measurement data input, level relay and transistor output
- reference voltage	250 V
- insulation resistance	2.3 kV
- test voltage	2.3 kV

CE conformity

VEGATOR 620 ... 622 signal conditioning instruments meet the protective regulations of EMC (89/336/EWG) and NSR (73/23/EWG). The conformity has been judged acc. to the following standards:

EMC	Emission	EN 50 081 - 1: 1992
	Susceptibility	EN 50 082 - 2: 1995
NSR		EN 61 010 - 1: 1993

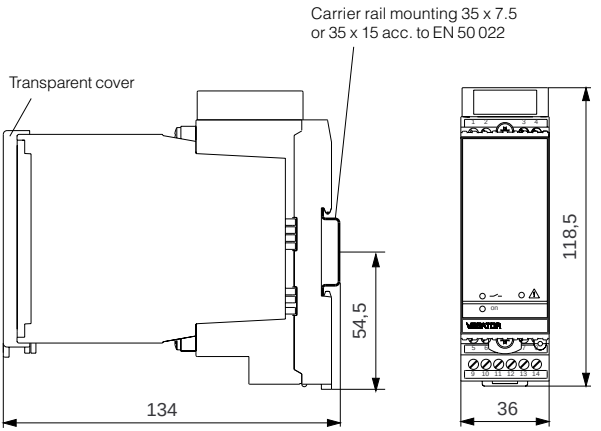
Ex technical data

Measurement data input (intrinsically safe signal circuit)

Classification	[EEx ia] IIC
Max. values	
- voltage	U_O - 20 V
- current	I_O - 125 mA
- wattage	P_O - 624 mW
Characteristics	linear
Effective internal inductance L_i	negligible
Effective internal capacitance C_i	negligible

	[EEx ia] IIC			[EEx ib] IIC
Max. permissible external inductance L_O	0.5 mH	1 mH	1.5 mH	2 mH
Max. permissible external capacitance C_O	97 nF	78 nF	68 nF	200 nF

The intrinsically safe circuits are reliably separated from the non intrinsically safe circuits up to a peak value of 375 V.
In case of failure, the max. voltage on the non intrinsically safe circuits must not exceed 250 V.



2 Mounting and installation instructions

Mounting

Each series 600 signal conditioning instrument consists of a terminal socket for carrier rail mounting DIN 46 277 and a module unit.

The supply voltage can be connected to the terminals 9 and 10 of the terminal socket.

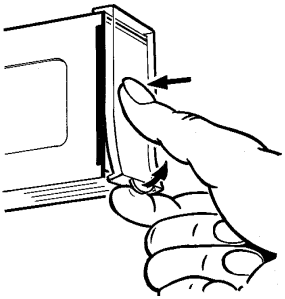
If there are adjoining series 600 instruments, it is possible to continue the connection L1 and N via the supplied jumpers.

Note!
The jumpers must never be used on single instruments or at the respective end of a row of instruments, as there is the danger of coming into contact with the supply voltage, or of causing a short circuit.

The signal conditioning instrument must always be mounted outside hazardous areas or special Ex protective measures must be taken.

Transparent cover

To protect the instrument against unauthorised or inadvertent use, the front plate of VEGATOR can be provided after setup with a lockable transparent cover. To remove transparent cover, see drawing below.



Coding

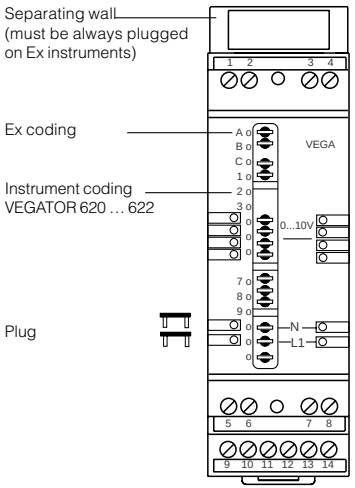
To avoid inadvertent swapping of the different signal conditioning instruments, the terminal socket is provided with pins and the signal conditioning instrument with appropriate gaps (mechanical coding). An instrument coding with coded pins in different positions ensures that the various signal conditioning instruments cannot get mixed up.

Ex instruments

An Ex coding with fixed coded pin ensures that non Ex and Ex instruments cannot get mixed up.

The coding is part of the explosion protection: On VEGATOR... Ex the supplied coded pins (instrument coded pin and Ex coded pin) must be inserted by the user according to the table below.

	Instrument coding	Ex coding
VEGATOR 620	2	—
VEGATOR 621	2	—
VEGATOR 622	2	—
VEGATOR 621 Ex	2	A
VEGATOR 622 Ex	2	A



3 Electrical connection

3.1 Connection instructions

The following connection plans are valid for standard as well as for Ex versions of the signal conditioning instruments. Please observe the following instructions:

- the relay contacts are shown in their condition in the absence of current
- if strong electromagnetic interferences are expected, we recommend the use of shielded cable for the signal cables
- the shielding must be grounded only on one sensor or signal conditioning instrument side
- if there is the danger of overvoltage, the use of VEGA overvoltage arresters is recommended
- the connection should be made according to country-specific installation standards (e.g. in Germany acc. to the VDE regulations).

3.2 Connection instructions for Ex approved applications

For the following applications, certified instruments are required:

- in hazardous areas (if necessary, observe the special national regulations)
- as part of an overfill protection system acc. to WHG
- in the shipbuilding industry
- for pressurized vessels.

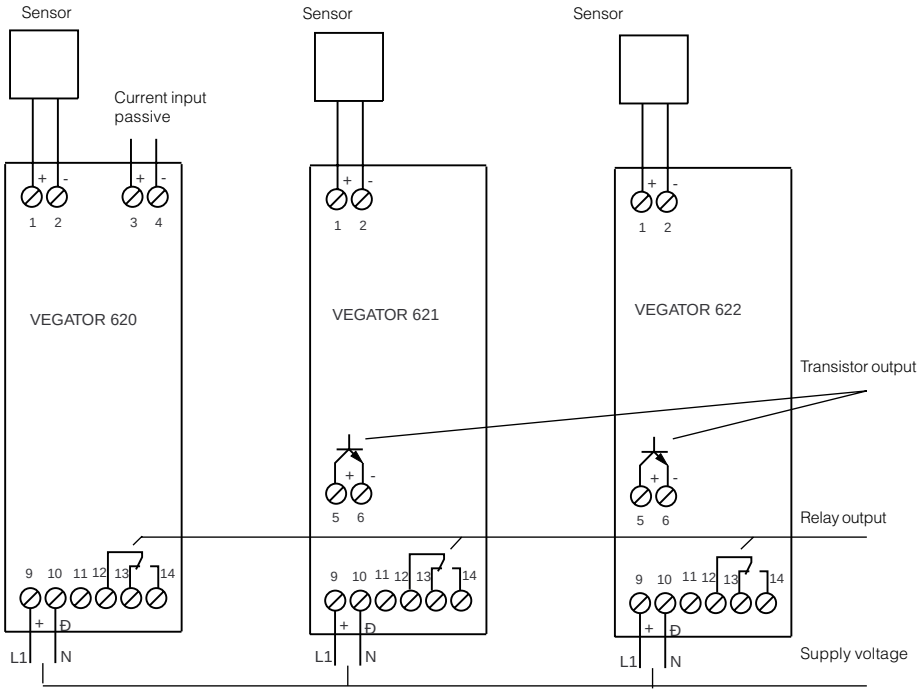
For these applications, the respective official documents (test reports, test certificates, general type approval and conformity certificates) as well as the applicable mounting and operating instructions should be observed. The official documents are supplied with the respective instrument.

In Ex applications, the voltage supply of the sensor must be delivered only through an intrinsically safe circuit. This can be done by means of:

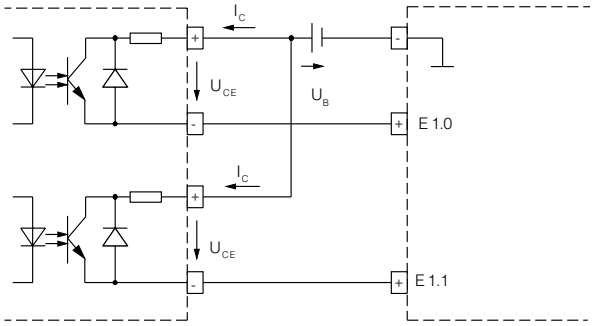
- VEGATOR series 600 signal conditioning instrument in Ex version
- not certified VEGATOR series 600 signal conditioning instrument with VEGA safety barrier type 145

Please also note the official documents of these additional instruments.

3.3 Connection diagrams

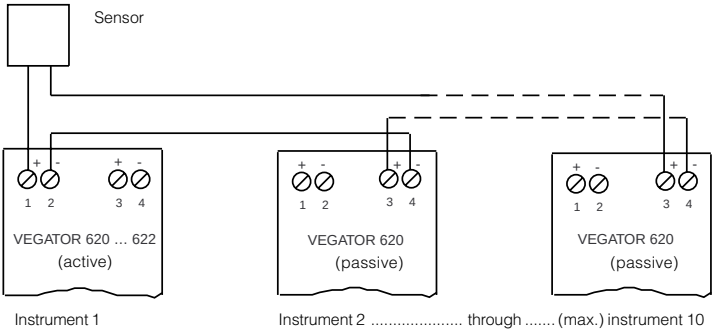


Transistor outputs in conjunction with a PLC



VEGATOR 621
VEGATOR 622

Extension example for VEGATOR 620
Instrument 1 = VEGATOR 620 ... 622 switched to active mode
Instrument 2 through (max.) 10: VEGATOR 620 switched to passive mode

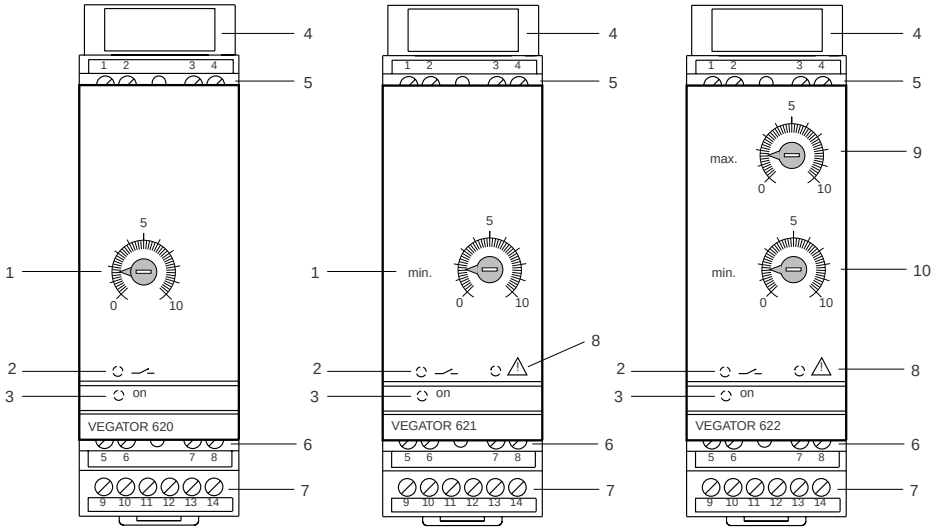


As the above extension example shows, it is possible to control several signal conditioning instruments with one sensor in order to detect different levels.

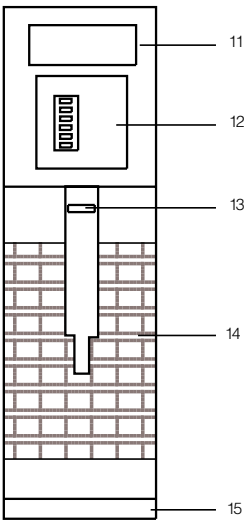
This wiring layout can be extended to include 10 instruments (loop current).

4 Setup

4.1 Indicating and adjustment elements



View, laterally on top



1 Potentiometer for switching point adjustment
2 Status indication of the outputs
3 LED, supply voltage
4 Separating wall
5 Terminals, inputs
6 Terminals, transistor output
7 Terminals, supply voltage and relay output
8 LED, fault signal
9 Potentiometer for max. switching point
10 Potentiometer for min. switching point

11 Bar code, serial number
12 DIL switch block
13 Screws
14 Ventilation opening
15 Transparent cover

Potentiometer
The potentiometers (1, 9 and 10), allow continuous adjustment of the switching points.

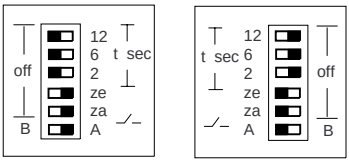
Signal lamps
Green (3)
- supply voltage available
- ready for operation

Yellow (2)
- status indication of the relay and transistor outputs
  LED lights (relay energised, transistor conductive), LED extinguished (relay deenergised, transistor blocked)

Red (8)
- failure indication

DIL switch block (12)
When VEGATOR is installed, the terminal socket covers the DIL switch block. Adjustments are only possible when the instrument is dismounted.

VEGATOR 620 **VEGATOR 621, 622**



The individual switches are assigned as follows:
- switch A/B: mode switch
  A - max. detection (overfill protection)
  B - min. detection (dry run protection)
- switch ze and za
  ze - switch on delay
  za - switch off delay
- switch 2, 6, 12
  With these you can adjust the delay time. The time intervals of the activated time switches sum up. When the on delay/off delay switches are switched on together, the set time is valid for both delay modes (see the following table).

Switch on/off delay	Switch za	ze	2	6	12
0,2 s	off	off	off	off	off
0,3 s	on	on	off	off	off
2 s	on	on	on	off	off
6 s	on	on	off	on	off
8 s	on	on	on	on	off
12 s	on	on	off	of	on
14 s	on	on	on	off	on
18 s	on	on	off	on	on
20 s	on	on	on	on	on

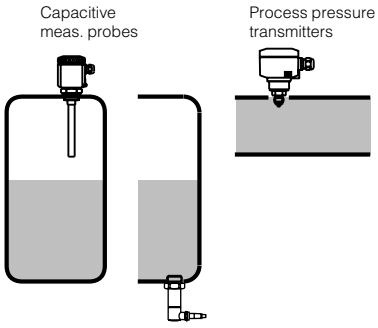
4.2 Setup sequence

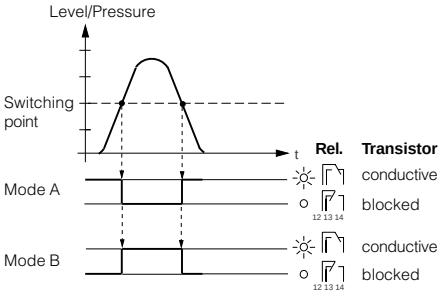
The following list explains briefly the essential setup steps
- mount the terminal socket
- wire the terminal socket according to your control requirements
- cover the input terminals with the separating wall (4)
- set the requested mode (A/B) on the DIL switch block (12)
- deactivate the on delay/off delay modes (switches ze, za, 2, 6, 12 to position „off“) on the DIL switch block (12)
- mount the instrument module onto the terminal socket
- switch on the power supply, the green LED (3) lights
- adjust the switching points acc. to „4.3 Switching point adjustment“
- if an integration time (on delay/ off delay) should be necessary, the instrument must be removed again to set the time on the DIL switch block (12).

4.3 Switching point adjustment

Adjustment example 1, mode A (overfill protection)

- VEGATOR 620, 621
- single point control
- sensors: vertically mounted measuring probes, hydrostatic pressure transmitters or process pressure transmitters



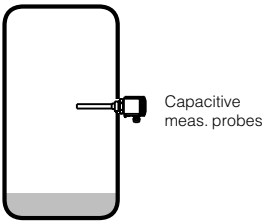


Procedure

- Set the potentiometer (1) to 10.
- Fill the vessel up to the requested level or pressure.
- Turn the potentiometer (1) very slowly anticlockwise until the status indication (2) changes, i.e. the status indication extinguishes.
- The signal conditioning instrument is now ready for operation.
  Please close with the transparent cover (15).

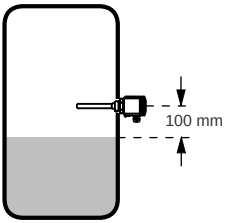
Adjustment example 2, mode B (dry run protection)

- VEGATOR 620, 621
- single point control
- sensors: horizontally mounted capacitive meas. probes or capacitive meas. probes for adhesive products

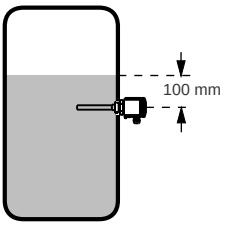


Procedure

- Set the potentiometer (1) to 0.
- Fill the vessel up to 100 mm below the electrode.



- Turn the potentiometer (1) very slowly clockwise until the status indication (2) changes, i.e. lights in mode A, extinguishes in mode B. Note the dial position of the potentiometers (1).
- Continue filling the vessel until the measuring probe is completely covered. With measuring probes for adhesive products, the sensitive tip must be covered completely (standard 100 mm above the electrode). The status indication (2) changes due to the additional filling.



- Turn the potentiometer (1) very slowly clockwise until the status indication (2) changes, i.e. lights in mode A, extinguishes in mode B. Note the position of the potentiometer.
- Determine the average value and adjust it on the potentiometer (1).
- The signal conditioning instrument is now ready for operation.
  Please close with the transparent cover (15).

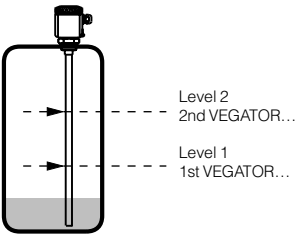
The relay and transistor output as well as the status indication behave in mode A and B as previously shown in „Adjustment example 1“, see top left.

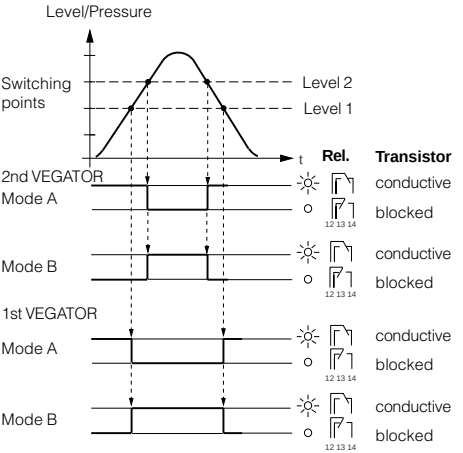
Procedure

- Set the potentiometers (1) of the two signal conditioning instruments to 10.
- Fill the vessel up to level 1.
- Turn the potentiometer (1) of the first VEGATOR ... very slowly anticlockwise until the status indication (2) changes, i.e. lights in mode B, extinguishes in mode A.
- Now fill the vessel up to level 2.
- Now turn the potentiometer (1) of the second VEGATOR ... very slowly anticlockwise until the status indication (2) changes, i.e. lights in mode B, extinguishes in mode A.
- The two signal conditioning instruments are now ready for operation.
  Please close each with the transparent cover (15).

Adjustment example 3

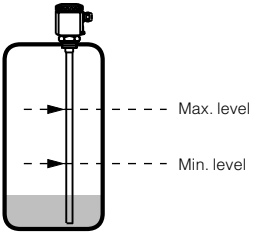
- two VEGATOR 620
- as dual single point control (see „3.3 Connection plans, extension example“)
- vertically mounted capacitive measuring probes

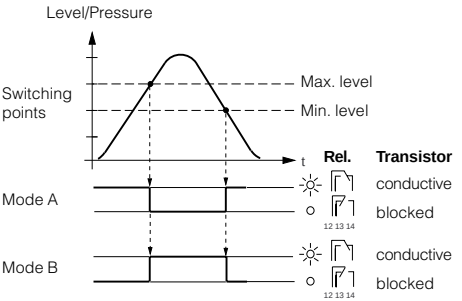




Adjustment example 4

- VEGATOR 622
- double point control
- sensors: vertically mounted capacitive meas. probes or hydrostatic pressure transmitters





Procedure

- Set both potentiometers (9 and 10) to 0.
- Fill the vessel to min. level.
- Turn the min. potentiometer (10) very slowly clockwise until the status indication (2) changes, i.e. lights in mode A, extinguishes in mode B.
- Now turn the potentiometer (9) to 10.
- Continue filling the vessel to max. level, the status indication (2) remains unchanged.
- Turn the max. potentiometer (9) very slowly anticlockwise until the status indication (2) changes, i.e. extinguishes in mode A, lights in mode B.
- The signal conditioning instrument is now ready for operation.
  Please close with the transparent cover (15).

Note:
VEGATOR 622 can also be used for single point control. The max. potentiometer must be set to 0, the min. potentiometer then acts as single point adjustment.

5 Diagnostics

5.1 Maintenance

The instrument is maintenance free.

5.2 Repair

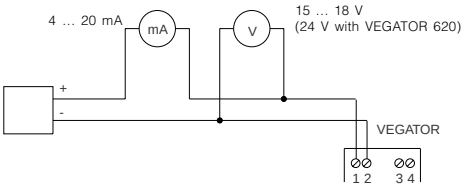
Repairs require accessing internal parts of the instrument to correct an instrument defect. For safety and warranty reasons, repair must only be carried out by qualified VEGA personnel.

In case of a defect, please return respective instrument with a short description of the flaw to our repair department.

Failures are short-term malfunctions caused by wrong adjustment or defects in the sensor or in the connection cables.

Failures, their possible causes and their rectification are listed under „5.3 Failure rectification“.

5.3 Failure rectification

Failure	Rectification / Measure
Instrument is dead/ Green operating lamp extinguishes	Check the voltage supply and the mains connections as described under „Connection instructions“. If the instrument still does not function, please call our service department.
VEGATOR 620 functions incorrectly or not at all	Check the sensor inputs for the following failures: - short-circuit on the input - sensor not connected correctly or polarity-reversed - sensor line interrupted - supply voltage too low
Red failure LED of VEGATOR 621 or 622 lights	Check if the sensor is connected correctly. - failures in the sensor, effecting a current change to below 2 mA or above 23 mA, generate a fault signal on VEGATOR. Measure the current in the connection cable to the sensor.  For Ex systems, make sure that the Ex protection is not degraded by the measuring instruments. **a. Current value < 2 mA** - Check the supply voltage on the connection cable to the sensor. The voltage should be at least 17 V. Should a value below 17 V be measured, it indicates a defect in the signal conditioning instrument. In this case, return the instrument for repair to VEGA. - If at least 17 V are available, separate the signal conditioning instrument from the connection cable and connect to the sensor input of the signal conditioning instrument a resistor of 2.2 kOhm. If the failure lamp continues to light, the signal conditioning instrument is defective. In such a case, return the instrument for repair to VEGA. - Should the failure lamp extinguish, reconnect the signal conditioning instrument. Separate the sensor from the connection cable and connect a resistor of 2.2 kOhm in its place. - Should the failure lamp continue to light, there is probably an interruption of the connection line. Check the connection cable to the sensor. - If the failure lamp extinguishes, the sensor is defective. Check the connected sensor.

Failure	Rectification / Measure
VEGATOR 620 functions incorrectly or not at all	
Red failure LED of VEGATOR 621 or 622 lights	**b. Current value > 22 mA** - Check all connections and the connection cable to the sensor. - Should the red failure lamp continue to light, separate the sensor from the connection cable and connect a resistor of 2.2 kOhm in its place. If the failure lamp extinguishes, the sensor is defective. Check the connected sensor. - Should the failure lamp continue to light, reconnect the sensor. Separate the signal conditioning instrument from the connection cable and connect a resistor of 2.2 kOhm to its sensor input. - Should the failure lamp continue to light, the signal conditioning instrument is defective. In such a case, return the instrument for repair to VEGA. - If the failure lamp extinguishes, there is probably a short circuit in the connection line. Check the connection cable to the sensor.

Note:
A flawlessly operating VEGATOR... has the following switching point values:

Potentiometer position	Sensor current
0	approx. 4 mA
5	approx. 12.5 mA
10	approx. 21 mA

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The statements on types, application, use and operating conditions of the sensors and processing systems correspond to the latest information at the time of printing.

Technical data subject to alterations

2.19 950 / July 2001